Gold King Mine Release
Sampling and Analysis Plan/Quality Assurance Project Plan

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TDD#:	0001/1508-04
Date:	8/10/2015
DCN:	W0267.1E.00532
Re:	Addendum 1 to Gold King Mine Release SAP/QAPP – Residential Water Sampling

Comments: This is Addendum 1 to the Gold King Mine Release SAP/QAPP, dated 8/8/15. This Addendum provides the following:

1. Written protocol for collecting water samples from residences within the area affected by the Gold King Mine release.
2. A field form for collecting information on residents contacted.
3. A field form for collecting information regarding sample collection at residences.

STANDARD OPERATING PROCEDURE

RESIDENTIAL POTABLE WATER SUPPLY SAMPLING

(Based on EPA Region 4 EPA guidance document SESDPROC-305-R3: Potable Water Supply Sampling)

1. SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the procedures to be used by field personnel when collecting and handling residential potable water supply samples in the field. On the occasion that field personnel determine that any of the procedures described in this section are either inappropriate, inadequate or impractical and that another procedure must be used to obtain a groundwater sample, the variant procedure will be documented in the field log book, along with a description of the circumstances requiring its use. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

2. EQUIPMENT

Personal protective equipment (see HASP)
Decontamination items
Rinse bottles
Trash bags
Paper towels
Field logbook
QAPP
Appropriate sampling device
Sharpies or other permanent marker

3. RELATED PROCEDURES

SOP ERT 2001	General Field Sampling Guidelines
SOP ERT 2006	Sampling Equipment Decontamination
SOP ERT 2049	Investigation-Derived Waste Management

SOP ERT 2016 Sediment Sampling

SOP G-12 Specifications and Guidance for Contaminant-Free Sample Containers

EPA-540-R-09-03 Contract Laboratory Program Guidance for Field Samplers

4. GENERAL PRECAUTIONS

4.1 PROCEDURAL PRECAUTIONS

The following precautions should be considered when collecting potable water supply samples.

- Special care must be taken not to contaminate samples. This includes storing samples in a secure location to preclude conditions which could alter the properties of the sample. Samples shall be custody sealed during long-term storage or shipment.
- Always sample from the anticipated cleanest, i.e., least contaminated location, to the most contaminated location. This minimizes the opportunity for cross-contamination to occur during sampling.
- Collected samples must remain in the custody of the sampler or sample custodian until the samples are relinquished to another party.
- If samples are transported by the sampler, they will remain under his/her custody or be secured until they are relinquished.
- Shipped samples shall conform to all U.S. Department of Transportation (DOT) rules of shipment found in Title 49 of the Code of Federal Regulations (49 CFR Parts 171 to 179), and/or International Air Transportation Association (IATA) hazardous materials shipping requirements found in the current edition of IATA's Dangerous Goods Regulations.
- Documentation of field sampling is done in a bound logbook of field sheet.
- Chain-of-custody documents shall be filled out and remain with the samples until custody is relinquished.
- All shipping documents, such as air bills, bills of lading, etc., shall be retained by the project leader and stored in a secure place.

4.2 SPECIAL PRECAUTIONS FOR POTABLE WATER SUPPLY SAMPLING

- A clean pair of new, non-powdered, disposable gloves will be worn each time a different location is sampled and the gloves should be donned immediately prior to sampling. The gloves should not come in contact with the media being sampled and should be changed any time during sample collection when their cleanliness is compromised.
- Sample containers for samples suspected of containing high concentrations of contaminants shall be stored separately.

- Sample collection activities shall proceed progressively from the least suspected contaminated area to the most suspected contaminated area if sampling devices are to be reused. Samples of waste or highly contaminated media must not be placed in the same ice chest as environmental (i.e., containing low contaminant levels) or background samples.
- If possible, one member of the field sampling team should take all the notes and photographs, etc., while the other members collect the samples.
- Samplers must use new, verified and certified-clean disposable or non-disposable equipment cleaned according to procedures contained in the ERT SOP 2006 Sampling Equipment Decontamination for collection of samples for trace metals or organic compound analyses.

4.3 SAMPLE HANDLING AND PRESERVATION REQUIREMENTS

4.3.1 Sample Handling and Preservation Requirements

The following should be used when collecting samples from potable water supplies:

- Potable water supply samples will typically be collected from a tap or spigot located at or near the well head or pump house and before the water supply is introduced into any storage tanks or treatment units. Efforts should be made to reduce the flow from either the tap or spigot during sample collection to minimize sample agitation.
- During sample collection, make sure that the tap or spigot does not contact the sample container. Place the sample into appropriate containers. Samples collected for VOC analysis must not have any headspace. All other sample containers must be filled with an allowance for ullage.
- Samples requiring reduced temperature storage should be placed on ice immediately.

4.3.2 Sample Containers

Refer to the Quality Assurance Project Plan (QAPP) (WESTON, 2015) and the EPA-540-R-09-03 Contract Laboratory Program Guidance for Field Samplers for information on the required size and type of sample containers. Samples should be collected and containerized in the order of the volatilization sensitivity of the parameters.

4.3.3 Sample Preservation

All samples requiring preservation must be preserved as soon as practically possible, ideally immediately at the time of sample collection. If preserved VOC vials are used, these will be preserved with concentrated hydrochloric acid by field personnel prior to departure for the field investigation. Field personnel will also preserve with sodium hydroxide for water samples that

are being analyzed for cyanide. For all other chemical preservatives, field personnel will use the appropriate chemical preservative generally stored in an individual single-use vial as described in ERT SOP 2016 Sediment Sampling and EPA-540-R-09-03Contract Laboratory Program Guidance for Field Samplers. The adequacy of sample preservation will be checked after the addition of the preservative for all samples except for the samples collected for VOC analysis. Additional preservative should be added to achieve adequate preservation.

4.4 QUALITY CONTROL

Equipment rinsate blanks should be collected if equipment is field cleaned and re-used on-site or if necessary to document that low-level contaminants were not introduced by any sampling equipment.

4.4.1 Documentation

Bound field logbooks should be used for the maintenance of field records. All aspects of sample collection and handling as well as visual observations shall be documented in the field logbooks.

All entries in field logbooks should be legibly recorded and contain accurate and inclusive documentation of project activities.

5. PROCEDURES

5.1 GENERAL

Obtain or confirm the following information:

- the name(s) of the resident(s) or water supply owner/operator
- the exact physical address
- the exact mailing address (if different from the physical address)
- the resident's/operator's home, work and mobile telephone numbers (when
- available)
- treatment system
- GPS coordinates of well location
- Photo documentation of well in relation to residence and spigot collecting sample from

The information is required so that the residents or water supply owner/operators can be informed of the results of the sampling program.

The following should be considered when choosing the location to collect a potable water sample:

- Taps selected for sample collection should be supplied with water from a service pipe connected directly to a water main in the segment of interest.
- Whenever possible, choose the tap closest to the water source, and prior to the water lines entering the residence, office, building, etc., and also prior to any holding or pressurization tanks.
- The sampling tap must be protected from exterior contamination associated with being too close to a sink bottom or to the ground. Contaminated water or soil from the faucet exterior may enter the bottle during the collection procedure since it is difficult to place a bottle under a low tap without grazing the neck interior against the outside faucet surface. If the tap is too close to the ground for direct collection into the appropriate container, it is acceptable to use a smaller container to transfer sample to a larger container. The smaller container should be made of glass or stainless steel, and should be decontaminated to the same standard as the larger container.
- Leaking taps that allow water to discharge from around the valve stem handle and down the outside of the faucet, or taps in which water tends to run up on the outside of the lip, are to be avoided as sampling locations.
- Disconnect any hoses, filters, or aerators attached to the tap before sampling. These devices can harbor a bacterial population if they are not routinely cleaned or replaced when worn or cracked.
- Taps where the water flow is not constant should be avoided because temporary fluctuation in line pressure may cause clumps of microbial growth that are lodged in a pipe section or faucet connection to break loose. A smooth flowing water stream at moderate pressure without splashing should be used. The sample should be collected without changing the water flow. It may be appropriate to reduce the flow for the volatile organic compounds aliquot to minimize sample agitation.

Occasionally, samples are collected to determine the contribution of system-related variables (e.g., transmission pipes, water coolers, water heaters, holding tanks, pressurization tanks, etc.) to the quality of potable water supplies. In these cases, it may be necessary to ensure that the water source has not been used for a specific time interval (e.g., over a weekend or a three- or four-day holiday period). Sample collection may consist of collecting a sample of the initial flush, collecting a sample after several minutes, and collecting another sample after the system being investigated has been completely purged.

5.2 PURGING

5.2.1 Potable Wells - Purging and Purge Adequacy

Wells with in-place plumbing are commonly found at residences. The objective of purging wells with in-place pumps is the same as with monitoring wells without in-place pumps, i.e., to ultimately collect a water sample representative of aquifer conditions.

Purging is the process of removing stagnant water immediately prior to sampling. In order to determine when an adequate purge has occurred, field investigators should monitor the pH, specific conductance and turbidity of the water removed during purging. For potable water supply sampling, it is recommended to purge the system for at least 15 minutes when possible.

An adequate purge is achieved when the pH and specific conductance of the potable water have stabilized and the turbidity has either stabilized or is below 10 Nephelometric Turbidity Units (NTUs). Although 10 NTUs is normally considered the minimum goal for most water sampling objectives, lower turbidity has been shown to be easily achievable in most situations and reasonable attempts should be made to achieve these lower levels. Stabilization occurs when, for at least three consecutive measurements, the pH remains constant within 0.1 Standard Unit (SU) and the specific conductance varies no more than approximately 10 percent. There are no set criteria establishing how many total sets of measurements are adequate to document stability of parameters.

If, after 15 minutes or significant temperature decrease indicating fresh groundwater has been reached, the in situ chemical parameters have not stabilized according to the above criteria, additional water can be removed. If the parameters have not stabilized after 15 minutes, it is at the discretion of the project leader whether or not to collect a sample or to continue purging.

A well with an intermittently run pump should, in all respects, be treated like a well without a pump. In these cases, parameters are measured and the well is sampled from the pump discharge after parameter conditions have been met. Generally, under these conditions, 15 to 30 minutes will be adequate.

5.3 INVESTIGATION DERIVED WASTE

Purging generates quantities of purge water or investigation derived waste (IDW), the disposition of which must be considered. See the ERT SOP 2049 for Investigation-Derived Waste Management for guidance on management or disposal of this waste.

6. POTABLE WATER SUPPLY SAMPLING METHODS – SAMPLING

6.1 GENERAL

Sampling is the process of obtaining, containerizing, and preserving (if required) a potable water supply water sample after the purging process is complete. It is recognized that there are situations, such as industrial or municipal supply wells or private residential wells, where a well may be equipped with a dedicated pump from which a sample would not normally be collected. Discretion should always be used in obtaining a sample.

6.1.1.1 Order of Sampling with Respect to Analytes

In many situations when sampling permanent or temporary monitoring wells, an adequate purge, with respect to turbidity, is often difficult to achieve. Removal and insertion of equipment after the purge and prior to actual sampling may negate the low turbidities achieved during purging and elevate turbidity back to unacceptable levels. For this reason, it is important that special efforts be used to minimize any disturbance of the water column after purging and to collect the aliquot for metals first.

A preferred collection order for some common parameters follows:

1. VOA.
2. Total organic carbon (TOC).
3. Extractable organics (base/neutral/acid (BNA) or semi-volatile organic compound (SVOC)).
4. Total metals.
5. Phenols.
6. Cyanide.
7. Total solids.

6.2 COLLECTING SAMPLES FROM RESIDENTIAL WELLS

Samples should be collected following purging from a valve or cold water tap as near to the well as possible, preferably prior to any storage/pressure tanks or physical/chemical treatment system that might be present. Remove any hose that may be present before sample collection and reduce the flow to a low level to minimize sample disturbance, particularly with respect to volatile organic constituents. Samples should be collected directly into the appropriate containers. It may be necessary to use a secondary container, such as a clean 8 oz. or similar size sample jar or a stainless steel scoop, to obtain and transfer samples from spigots with low ground clearance. All measurements for pH, specific conductance and turbidity should be recorded at the time of sample collection.

1. Ideally, the sample should be collected from a tap or spigot located at or near the well head or pump house and before the water supply is introduced into any storage tanks or treatment units. If the sample must be collected at a point in the water line beyond pressurization or holding tank, a sufficient volume of water should be purged to provide a complete exchange of fresh water into the tank and at the location where the sample is collected. If the sample is collected from a tap or spigot located just before a storage tank, spigots located inside the building or structure should be turned on to prevent any backflow from the storage tank to the sample tap or spigot. It is generally advisable to open several taps during the purge to ensure a rapid and complete exchange of water in the tanks.

2. Purge the system until temperature readings drop to approximately 10-15°C or for at least 15 minutes, when possible. During the purge period, obtain at least three sets of readings as follows: after purging for several minutes, measure the pH, specific conductivity and turbidity of the water. Continue to measure these parameters to assess for stabilization.

3. After three sets of readings have been obtained, samples may be collected. If stabilization has not occurred or after the 15-minute purge period, it is at the discretion of the project leader to collect the sample or continue purging and monitoring the parameters. This would depend on the condition of the system and the specific objectives of the investigation.

6.3 SPECIAL SAMPLE COLLECTION PROCEDURES

Special sample handling procedures should be instituted when trace contaminant samples are being collected. All sampling equipment which comes into contact with the water must be cleaned in accordance with the cleaning procedures described in the ERT SOP 2006 for Sampling Equipment Decontamination as applicable.

7. BIBLIOGRAPHY

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Project:

Date	Initiated by	Contact Number (address or phone)	Notes

Field Sheet – Residential Water Sampling

Property Information					
Sampler Names/ID:				Date:	
Pad ID:		Property ID:		Parcel ID:	
Well Owner Name:			Well Owner Address:		
Well Owner Phone:		Alt Phone:	Property Address (Location of well if different from owner address):		
Occupant Name (if applicable):			Occupant Phone (if applicable):		
Property Type (Used as residence, for livestock, etc.):		Water Usage (Drinking water, recreation, livestock, etc.):		Water Disposal (City Sewer, Septic, Etc.):	
Weather:					
Well Information (Please Confirm if Possible)					
Well Permit Number:		Well Depth (ft):		Well Construction Date:	
Latitude (Dec. Degrees):		Longitude (Dec. Degrees):		Lat/Long Accuracy (ft):	
Ambient Wellhead Screening:	Time:	Time:	Well Ventilation:		
	ppm	%LEL	Sample Collection (pre/post treatment):		
Screened Interval (ft):			Water Level (ft):		
Treatment System (Water softener, filter, pressure tank, etc.):			Well Casing Diameter (inches):		
System Volume (Est.):		Purge Volume (gal):		Flow Rate (Est.):	
Sample Information					
Sample ID:		Sample Time:	Sample COC:		
pH:	Temp °F:	DO %:	Running Water	Time:	Time:
Turbidity (NTU):	Conductivity (mS/cm):	Effervescence:		ppm	%LEL
Color:	Clarity:	Odors:	Head Space	Time:	Time:
Sample Description:				ppm	%LEL

Notes:

Project:
